

Gentle, modest and retiring, absorbed in his work, careless about worldly applause, and always happiest in the midst of his charming family, Fouqué was an example of one of the best types of a scientific man. His death makes an irreparable blank in the scientific society of Paris, and has filled with sorrow the heart of everyone who had the privilege of his friendship.

A. G.

NOTES.

A MEMORANDUM by the financial secretary to the Treasury explaining the estimates for Civil Services and the Revenue Departments, 1904-5, was issued on Tuesday. The estimate for education, science and art, is 15,798,217*l.*, which is an increase of 1,217,893*l.* above the amount for 1903-4. The 1903-4 figures include a supplementary estimate of 45,000*l.* for the relief of the National Antarctic Expedition—a service of a quite exceptional character, for which any provision that may prove to be necessary next year will be made in a similar form. The bulk of the addition arises on the vote for the Board of Education, as the result of recent legislation, but Public Education (Scotland), Public Education (Ireland), and Universities and Colleges (Great Britain) also show increases. The Board of Education (England and Wales) requires 985,131*l.* more than this year. Of this increase 50,580*l.* is for grants for training teachers, pupil teachers, &c., and 52,303*l.* for grants in respect of education other than elementary. The principal increase, however (889,888*l.*), is for grants towards expenditure on public elementary schools. Universities and colleges, Great Britain, will require an additional 32,100*l.* to provide for grants for the new universities at Liverpool and Leeds (for each of which 2000*l.* is included), and for the proposed augmentation of the grants in aid of colleges, for which 54,000*l.* is inserted, or double the amount voted in the current year.

A REUTER telegram from Vienna, dated March 19, states that at the request of the Academy of Science, the Austrian Minister of Agriculture, in order to facilitate the solution of certain important questions relating to the nature of radium, has ordered that from January 1 last until further notice no trading should be permitted in the residues from the manufacture of uranium colours at Joachimsthal, and that 10,000 kilogrammes of those residues should be reserved for purchase by the academy and another 10,000 kilogrammes for M. and Madame Curie, in Paris. These consignments are to be devoted entirely to the purpose of scientific experiment.

At Paris on Friday last M. and Madame Curie were honoured by the Municipal Council at the Hôtel de Ville, and congratulated on their researches on radium. The two investigators were presented with silver medals bearing the inscription, "City of Paris to M. Pierre Curie and Mme. Marie Curie, Laureates of Nobel prize in 1902."

THE *Washington Evening Star* states that the U.S. Congress has granted 5000*l.* for the continuation of Dr. S. P. Langley's experiments on aerial flight.

PROF. ABBE, professor of physics at Jena, and Prof. Neumann, professor of mathematics at Leipzig, have been appointed members of the Bavarian Maximilian Order for Science.

THE *British Medical Journal* announces that two distinguished physiologists, Prof. Luigi Luciani, Rome, and Prof. Angelo Mosso, Turin, have been named Senators of the Kingdom of Italy.

THE death is announced, at the age of sixty-five, of M. Jules Garnier, known for his explorations in New Caledonia and for his geological map of this district. His discovery of nickel ores in this French colony popularised the use of nickel in France, and was thus of material advantage to the colony. He was one of the founders of the French society of commercial geography.

A NUMBER of letters have been appearing in the *Times* with reference to the electric railways to be constructed in the heart of the Snowdon district, which, it is urged by several correspondents, will greatly impair the natural beauties of the neighbourhood. The scheme includes the electrification of the narrow gauge "toy" railway from Dinas to Snowdon, the extension of this line through Beddgelert to Portmadoc, and also the construction of a branch line from Beddgelert through Pen-y-gwryd and Capel Curig to Bettws-y-Coed. These extensions have been sanctioned by the Light Railway Commissioners, and a Bill for a further extension from Dinas to Carnarvon was before a House of Lords Committee last week, the preamble of which it found proved. The railway will thus not only serve a district largely frequented by tourists, but will enable the slate from the quarries to be brought down easily to Carnarvon without the two or three changes of conveyance now necessary. It is also proposed to supply power to the quarries; the power is to be obtained from Llyn Llydaw, on the slopes of Snowdon, whence a pipe line will be run to the nearest point on the railway at which a generating station will be built.

THE completion of the electrical equipment of the Liverpool and Southport line of the Lancashire and Yorkshire Railway must be regarded as an important step in the progress of steam railway electrification. This is the second steam railway to be electrified, but the change is of more importance in this case than in that of the Mersey Railway on account of the fact that it is likely to lead to the electrification of all the suburban lines of the Lancashire and Yorkshire Railway, and possibly also of the London and North-Western Railway. The section which has just been electrified is nearly twenty miles in length, and has to deal almost entirely with passenger traffic. The effect of the electrification will be nearly to double the number of trains running between the two termini, and to reduce the time taken over the journey from 54 to 37 minutes. Power is generated at Fromby, nearly at the middle of the line, at 7500 volts three-phase; this is transformed down and converted to continuous current at 600 volts, at which pressure the train-motors are supplied. The current is collected from a third rail outside the track rails, and each train has two motor-cars, one at each end, with two trailers in between. It is pleasant to note, considering that all our electrical tramway equipment has been borrowed from America, that the whole of the equipment of this line is of English design and manufacture, the rolling stock having been made by the railway company, and all the rest of the work executed by Messrs. Dick, Kerr and Co.

THE figures published by Mr. J. W. Bradley, engineer to the City of Westminster, giving the results of tests on the different lamps employed in street lighting, are exceedingly valuable as the tests are made under actual working conditions and include all costs of maintenance, interest on capital, sinking fund, &c. The results of the sixth series are published in the *Electrician* of March 11. From this series of tests Sugg's high pressure lamps in Parliament Street come out cheapest (7.65 pence per candle-power year), the arcs on the Westminster Supply Corporation

being second best (8.73 pence per candle-power year). As the average of the six series of tests, however, this order is reversed, the arcs being cheapest (8.7 pence) and the incandescent gas second (9.85 pence). It is to be noted, however, that the cost of the arc lighting seems to vary considerably with the type of lamp and conditions of contract; there are three different electricity supplies in the City of Westminster, and the cost of the arcs on these three supplies is respectively 11.5, 15.1 and 8.7 pence per candle-power year. The triple flat-flame burners in the Strand cost 47.5 pence, and, indeed, there is apparently no other form of lighting that can compete with the arcs or Sugg's high pressure burners.

THE report of the departmental committee on the use of electricity in mines which has recently been published is likely to be read with the greatest interest by all electrical and mining engineers. There can be little doubt that electrical machinery, which is already in considerable use in mining both here and abroad, is destined to play a still more important part in the future. The extreme flexibility of an installation of electric power is particularly advantageous in mining work, and numerous machines for performing the heavier mining operations have been constructed. The objection on the score of danger, especially in mines liable to an explosive atmosphere, is not in reality a serious one, as proper design and supervision of the machinery are easily obtained. The proposed rules which have been drawn up at the end of the report referred to above, though at first reading they may seem too stringent, should have the effect of ensuring the safety of the miners and of begetting confidence in electrical working, so that one may hope that the report will stimulate the application of electricity to mining.

DR. C. BARUS, of Brown University, Providence, R.I., has sent us several photomicrographs of fog particles condensed on X-ray and other nuclei. Unfortunately the details of the photographs are too fine to be reproduced satisfactorily in these pages. The nuclei were produced by passing the X-rays for from one to ten minutes through saturated dust-free air in a large condensation chamber. The nearly cubical chamber was made of wood impregnated with resinous cement, lined with a double layer of wet cotton cloth, and provided with faces of plate glass. The particles were caught on a plate of microscope glass covered with an oil film and exposed to the subsiding fog for thirty seconds. The plate was then adjusted for photography in the ensuing thirty seconds. In one photomicrograph fog particles of all sizes from about 0.0005 cm. to 0.0020 cm. are present, indicating a similar gradation of nuclei. Extremely fine fog particles (0.0003 cm. to 0.0009 cm. in diameter) appear on another picture corresponding to the large green-blue-purple corona, and are due to condensation on phosphorus nuclei. Dr. Barus hopes to apply this photographic method to the study of atmospheric nucleation, and thus to obtain those important but small qualitative differences of nucleation which must vanish from the corona as a whole.

REFERENCE is made in the *Times* of March 9 to a despatch which has been received by the India Office in which the Indian Government indicates the methods by which it hopes to effect an improvement in the quality of exported Indian cotton. The most difficult question, and one for which no remedy has been found, is how to prevent the admixture of inferior grades in the packing. The other problem which is engaging the attention of the Government is concerned with the improvement of the seed so that the

cotton obtained may be of better quality. The acclimatisation of foreign species has not been attended with much success, but the Government now hopes to attain its object by the improvement of some of the indigenous species either by selection or by hybridisation. Experiments are in progress at Surat, and also in Behar, in the United Provinces, and in the Punjab.

It has generally been assumed that in the wood of trees, especially the heart-wood, the cell-walls are entirely lignified, so that the paper contributed by Prof. M. C. Potter to the *Annals of Botany*, in which he gives proof of the cellulose-staining qualities of the walls of some cells, even in the heart-wood of trees forty and sixty years old, will lead to a modification of present conceptions. Another fact emphasised in the paper, but which has been known since Hartig treated the subject in 1878, is the digesting action of certain fungi by which lignin is changed into cellulose compounds, and, as Prof. Potter shows, the same result is obtained by steaming wood, the explanation being that the water extracts from the wood the substance which gives the characteristic lignin reaction.

THE vital importance to farmers of a thorough knowledge of the habits of the insects which damage their crops and granaries is gradually being recognised by all civilised nations, and Italy is now taking up the matter in real earnest. From that country we have received Nos. 7 and 8 of the second series of the *Bolletino* of the Royal Higher School of Agriculture in Portici, the former dealing with insects injurious to stored grain, and the latter with the scale-insects of the genus *Diaspis*. Both are illustrated.

FROM the U.S. Department of Agriculture we have received two *Bulletins* issued by the division of entomology. In the one Mr. F. M. Webster treats of insects attacking the stems of growing cereals and the best means of destroying them. It appears that in the States the injuries inflicted on corn-stalks by no less than eight species of minute flies are all laid to the charge of the Hessian fly, and it is the object of the paper to point out how these different species and their modes of attack can be distinguished from the latter. In most instances the ravages of these insects can be prevented or mitigated by very simple measures. The second paper, by Mr. F. H. Chittenden, is devoted to the insect enemies of the sugar-beet. Although the beet-sugar industry is still in its infancy in the States, about 150 species of insects are known to prey on beet, and although comparatively few of these inflict serious losses, there is little doubt that, as the cultivation of this crop increases, other kinds will use it as a food-supply, so that more extensive injuries may be looked for every successive season.

WHATEVER difference of opinion may exist as to the advisability of the restricted sense in which mammalian generic names are now employed by a number of zoologists, and likewise with regard to the revival of obscure and frequently "barbarous" names for such genera, absolute unanimity must prevail among all naturalists as to the value and importance of a thoroughly complete and trustworthy list of all the generic names for mammals which have ever been given. Such a list has been compiled, with immense labour, by Mr. T. S. Palmer, and forms No. 23 of the "North American Fauna," in course of publication by the Biological Division of the U.S. Department of Agriculture. When it is stated that up to the end of 1900 more than 4000 generic names for mammals had been proposed, and that more than 100 new ones were added in 1901, some idea of the magnitude of Mr. Palmer's task may be gleaned, although only

those who have been accustomed to work of this nature are able to appreciate this fully. This is, however, by no means all, for the list before us differs from most of its predecessors in giving the family and ordinal groups to which the various genera respectively belong, thus not only greatly increasing the labour, but likewise vastly enhancing the value of Mr. Palmer's "Index."

UNDER the title of "On Humanising the Animals," Mr. J. Burroughs, in this month's issue of the *Century*, continues his protest against the practice of attributing human powers of thought and prescience to animals. While admitting that the example of parents stimulates the imitative instincts of their offspring, the author insists that teaching—in the sense of imparting true knowledge—is conspicuous by its absence in all animals. Such communications as do pass between animals (and means of communication undoubtedly exist) relate only to the present, and have no reference to either the past or the future. Hence they come under the denomination of feeling or emotion, in contradistinction to knowledge. Such communications are, however, undoubtedly of value to the young, which always thrive far better when reared by their parents than when brought up by hand. As regards the means by which large bodies of animals, such as flocks of starlings or peewits, herds of deer or antelope, or shoals of herring or mullet, act in complete unison, as if acting under the influence of a leader or a code of instruction, the author is inclined to attribute the phenomenon to something analogous to telepathy in mankind. "There is nothing," he writes, "in this state of things analogous to a military organisation. The relation among the members of the flock is rather that of creatures sharing spontaneously the same subconscious or psychic state, and acted upon by the same hidden influence, in a way and to a degree that never occur among men."

THE development of the giant salamander (*Megalobatrachus maximus*) of Japan forms the subject of a paper by Dr. C. Kerbert, of Amsterdam, in No. 10 of vol. xxvii. of the *Zoologisches Anzeiger*. A female at Amsterdam laid a number of strings of eggs, which were deposited in a heap at the bottom of the water. As they lay there, the male on two occasions forced himself into the midst and communicated a vibrating motion to the whole mass, apparently to allow a free percolation of water between the eggs. This constitutes a new phase of the many examples in which male amphibians assist in the care or hatching of the eggs. The newly-hatched tadpoles have three pairs of external gills, and are remarkable for the circumstance that the extremities of the anterior limbs are bifid. The figures of certain newly-hatched tadpoles reproduced by the Messrs. Sarsin as those of the giant salamander have been shown to belong to *Onychodactylus japonicus*, and Dr. Kerbert's specimens are therefore the first examples at this age known to science.

LAST May Major Leishman, R.A.M.C., described certain bodies which he believed to be parasitic in nature, and which were obtained from a case of fever with enlarged spleen (not malaria) contracted in India. These bodies have since been studied by Donovan, Laveran, Ross, and Manson and Low in cases of the disease known as kala azar. The parasite is a small rounded or ovoid body about 3-7 μ in diameter, and either free or embedded in a matrix, in which case as many as twelve may be present in one mass. Each body consists of a larger and of a smaller mass of chromatin, and the free forms are encapsuled. These bodies have so far not been met with except in the spleen. Leishman at first believed that they were de-

generate trypanosomes, Laveran has placed them in the genus *Piroplasma*, but since they are not intracorporeal this hardly seems to be correct, and Ross now considers that they may belong to a new genus of sporozoa, and suggests for them the name *Leishmania donovani*.

WE have received from Mr. E. Philip, of Cardiff, a form of spintharoscope called Perman's radioscope, which gives the now well-known scintillations on a blende screen with marvellous brilliancy. The following statement is made in the circular which accompanied it:—"The effect is somewhat the same as in Crookes's spintharoscope, but the radium is spread over a larger surface and produces a very pleasing and striking appearance, resembling a multitude of bright stars twinkling brilliantly in a dark sky. Moreover, in different instruments different effects are produced owing to differences in the arrangement of the radium salt. The effect is produced by the radiation from the radium known as the α -rays, which consist of minute particles of atomic size; these are projected forth with great velocity, and when they strike the blende screen cause cleavage of the minute crystals which they meet, the cleavage being accompanied by a flash of light or scintillation. These or similar scintillations are being constantly produced spontaneously in hexagonal blende, and can be seen at any time, when the eye is sufficiently sensitive, by looking into a radioscope tube *without any radium*; but under the influence of the radium they are increased enormously in number and brightness." In the specimen forwarded to us sufficient variation of focus to suit different eyes is not provided.

THE *Quarterly Journal* of the Geological Society for February contains a short but interesting article by Mr. and Mrs. Clement Reid on their discovery of a probable Palæolithic floor at Prah Sands, about seven miles east of Penzance. This ancient floor was shown to overlie the raised beach, which rests on an uneven rocky platform that is about 15 feet above high-water mark. The floor is formed of loam which at one time was a true land surface, as it is full of small vertical roots. Towards the top of it is a black layer, with fragments of charcoal, burnt bone, and burnt earth. The authors conclude that here is evidence of a land surface on which Palæolithic man made hearths and lighted fires. They found also in this black layer pieces of vein-quartz, apparently fashioned into rude implements. Above this earthy deposit was a thick mass of angular detritus or "head," which was banked up against the old sea-cliff, and is generally considered to belong to the later stages of the Glacial period. In the same *Journal* Mr. E. T. Newton records the discovery, for the first time in Britain, of the remarkable genus of fishes known as *Edestus*. It was obtained from the Coal-measures of north Staffordshire. Prof. J. W. Gregory writes on the Glacial geology of north-west Tasmania in a well illustrated article, in which he shows that the lowest level at which evidence of Pleistocene glaciers has been found is 400 feet above sea-level. There is, however, evidence of more recent uplift of the land.

PROF. S. P. LANGLEY'S biographical notice of James Smithson, the founder of the Smithsonian Institution at Washington, has been reprinted from "The Smithsonian Institution, 1846-1896: the History of its First Half Century," edited by the late Dr. G. Brown Goode.

A SECOND edition of Dr. Holmes C. Jackson's "Directions for Laboratory Work in Physiological Chemistry" has been published in New York by Messrs. John Wiley and Sons, and in London by Messrs. Chapman and Hall, Ltd. The book has been thoroughly revised, and numerous additions have been made to the subject-matter.

WE have received a copy of the first issue—that for 1903—of *Mimir*, which is wholly concerned with Iceland and Icelandic institutions. The annual publication is intended to help Icelandic research, to keep the people of Iceland and the foreign student informed of the progress of this research, and to promote the proper development of the island and its people. Among the interesting contents we notice the account of institutions in Iceland, the addresses of foreign students of Old-Northern letters, and numerous notes on Icelandic matters of general interest. *Mimir* is printed in English, and is published by Martius Truelsen, of Copenhagen.

THE tables relating to the output of coal and other minerals and the number of persons employed at mines worked under the Coal and Metalliferous Mines Regulation Acts during the year 1903 have now been printed. The tables have been prepared by direction of the Home Secretary from returns furnished by H.M. Inspectors of Mines; and they form part of the general report and statistics for 1903 of mines and quarries. The output of coal from mines under the Coal Mines Regulation Act, which was 227,084,871 tons in 1902, was 230,323,391 in 1903, showing an increase of 3,238,520 tons. The number of persons employed at these mines in 1903 was 842,066, an increase of 17,275.

Two new general methods of preparing aldehydes are given in the current number of the *Comptes rendus*. The first of these, by M. E. E. Blaise, consists in the conversion of the acid through its bromine derivative into the corresponding α -hydroxy-acid, which by the action of heat is first converted into a lactide, and this on distillation splits up into carbon monoxide and the aldehyde of the next lower acid. The yields are very good, from 50 to 60 per cent. of the acid employed, and from the results obtained would appear to be generally applicable to the higher fatty acids. The second method, published by M. F. Bodroux, is based upon the action of magnesium alkyl compounds in toluene solution upon ethyl orthoformate. Here again the reaction gives good yields—from 55 to 75 per cent. of the theoretical—and the examples given by the author include members of both the fatty and aromatic series.

THE Geneva *Archives des Sciences* for January contain an important article on the theory of nickel steels, by M. Guillaume, of the Bureau international des Poids et Mesures. One of the most important properties of these alloys is their low coefficient of expansion, which becomes zero at about 36 per cent. of nickel. It is pointed out that the conversion, below 890° C., of the hard, non-magnetic γ variety of iron into soft, magnetic α iron is accompanied by an expansion of 3 mm. in a rod a metre long. The addition of nickel lowers the transition temperature until in presence of 20 per cent. of nickel magnetic properties only appear when the alloy has been cooled below 200°, whilst (owing to a kind of thermal hysteresis) the magnetic properties do not disappear again until the alloy has been heated to 600° C. In the non-expansive alloys the transition temperature appears to have been brought down to atmospheric temperatures, and the constancy of length is attributed to the same change in structure as that which causes the abrupt expansion in pure iron when cooled below 890°. A striking proof of the correctness of this view was obtained; by cooling a metre rod in liquid air, when it suffered a permanent expansion of 3.9 mm., and subsequently showed the high coefficient of expansion characteristic of α iron in place of the lower coefficient characteristic of γ iron.

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THE additions to the Zoological Society's Gardens during the past week include a Green Monkey (*Cercopithecus callitrichus*) from West Africa, presented by Mrs. L. A. Moline; a Vervet Monkey (*Cercopithecus landii*) from South Africa, presented by Captain Campbell; two Eastern Sarus Cranes (*Grus antigone*) from Northern India, presented by Lieut.-Colonel H. H. Smyth; a Greater Sulphur-crested Cockatoo (*Cacatua galerita*) from Australia, presented by Mr. C. Hammett; a Hybrid Pheasant (between *Phasianus reevesi* and *Euplocamus nycthemerus*), presented by the Earl of Ducie; two Ring-tailed Lemurs (*Lemur catta*) from Madagascar, an Azara's Opossum (*Didelphys azaroe*) from South America, a Blue-necked Cassowary (*Casuarius intensus*) from New Guinea, four Dusky Francolins (*Pternistes infuscatus*), two Jackson's Francolins (*Francolinus jacksoni*), two Schueth's Francolins (*Francolinus schuethi*) from East Africa, two Hybrid Parrakeets (between *Platycercus semitorquatus* and *P. barnardi*) from Australia, deposited. In additions in last week's issue (p. 473), Snow Leopard presented by Major Cox should read Major Mackintosh.

OUR ASTRONOMICAL COLUMN.

VARIATIONS OF THE MARTIAN CANALS.—During the 1903 opposition of Mars, Mr. Lowell observed changes in the canals which he believes were the results of artificial interference. Among the canals mapped by Schiaparelli in 1877 were three, situated on the eastern edge of the Syrtis Major, which met at a common point, the Lacus Tritonis, and which he named Thoth, Triton and Nepenthes respectively. In 1882 and 1884 Thoth appeared double, but was undoubtedly seen, and in 1884 Nepenthes was also distinctly double.

At the commencement of Mr. Lowell's observations in 1894 he was surprised to find no trace of these three canals, or of the Lacus Moeris, a widening of Nepenthes, although other well known but smaller features were plainly visible. Instead of Thoth another canal, which he named Amenthes, appeared, running from Syrtis Minor to the Aquæ Calidæ, nearly parallel to the earlier recorded directions of Thoth and Triton. During the oppositions of 1896-7 and 1901 this continued as an easily seen object, and Mr. Lowell concluded that it was really Thoth which had been wrongly placed on the earlier drawings. During February and March, 1903, Amenthes was still visible but less distinct, and on April 19 it was accompanied by Thoth in exactly the position shown on Schiaparelli's earlier map; on April 20 Thoth alone was visible. Suddenly, on May 29, the Lacus Moeris, which had long been given up, appeared and became a noticeable feature of that region of the planet's surface. In July Amenthes reappeared alongside Thoth and Triton, and thus settled the question of the presence of two canals.

These changes are entirely independent of the seasonal changes, and whilst the two "visibility" curves of Thoth and Amenthes vary inversely, the curve derived from the summation of them agrees very closely with that of a "mean" canal, for which only the seasonal changes have as yet been observed.

From these phenomena Mr. Lowell reasons that owing to the small amount of water on Mars it becomes necessary to irrigate the surface in sections, and for this purpose the canals are artificially regulated, Thoth and Amenthes being allowed to fill up and irrigate the regions surrounding them alternately (Lowell Observatory Bulletin, No. 8).

PROF. BURNHAM'S MEASURES OF DOUBLE STARS.—One of the *Decennial Publications* (vol. viii.) of the Chicago University is devoted to a record of the measures of double stars made by Prof. S. W. Burnham with the Yerkes 40-inch refractor during 1900 and 1901. The systems which have been measured are those which have been long neglected and are little known, and those which, from the few early measures or the uncertainty of their results, could not be classified as to their motion or otherwise. Most of the pairs were selected from the Herschel and South cata-